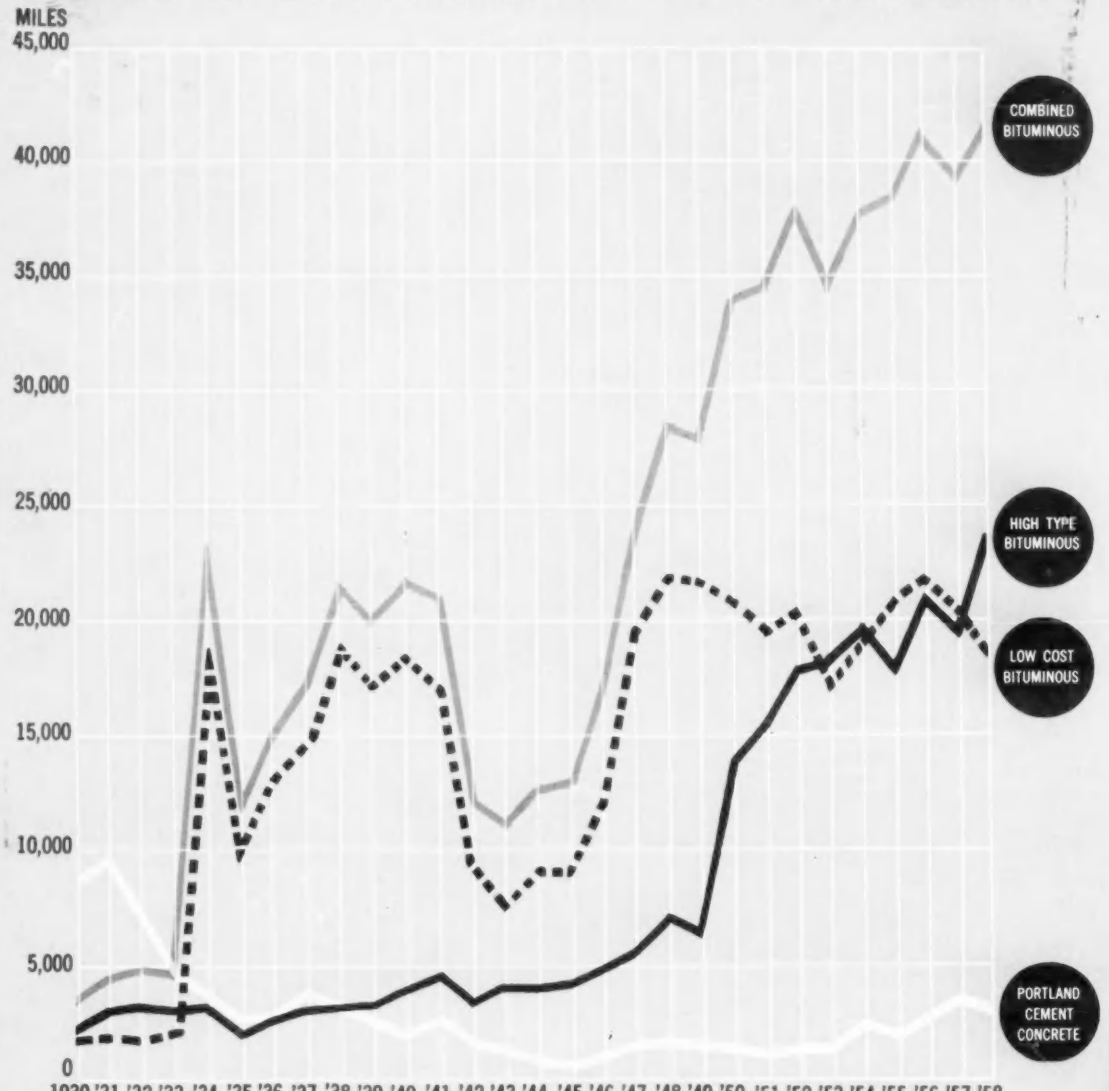
ASPHALT INSTITUTE Quarterly

OCTOBER, 1960

In this issue: **THE SEARCH FOR STABILITY**

MILEAGE BUILT ANNUALLY BY STATE HIGHWAY DEPARTMENTS

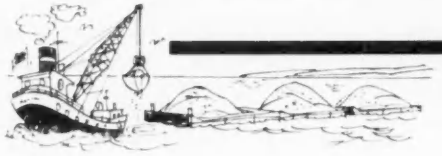


IN 1958, 94% OF ALL PAVED MILEAGE CONSTRUCTED BY STATE HIGHWAY DEPARTMENTS WAS SURFACED WITH ASPHALT

CHARTED BY THE ASPHALT INSTITUTE

Source: U.S. Bureau of Public Roads *Tables SMB 1-5*

ASPHALTOPICS



Our July report on Philadelphia's street overhaul (nearly one million tons of hot mix annually), got an Auburn, Maine, reader all worked up. Pointing out that this means many millions of tons of mix are used each year in the United States, he goes on to argue that road-building is scarring the nation with thousands of quarry and gravel pits. He rises to inquire: "Why don't you obtain your gravel from the ocean, bringing soil back to the nation?" It may come to that, if we can't come up with a substitute for stone (See Research: pp. 8-9.)

Meanwhile, from Mr. P. R. Smith of the engineering firm of Smith-Bercall Co. Inc., in Rutherford, N.J., comes this interesting footnote to an item that appeared in this space: "You may be interested in knowing that before we entered the war, I was engaged in making 'plastic armor' for the British and that during the war some 3500 American ships were protected with this material. Plastic armor is actually better than steel armor on a weight basis, although not on a thickness basis. The material, as envisaged by Terrell (Edward Terrell, British naval officer honored by the Crown for developing the idea), was conventional asphalt paving but subsequent work improved the product vastly. It makes quite an interesting story and probably is worth writing as the development was unique and illustrates that asphalt has many uses."

Best safety records in 1959 were compiled by asphalt-paved toll roads. New Hampshire, Maine, Virginia, and Florida turnpikes ran up a grand total of 153.3 million miles without a traffic death. Actually, best record for a heavily traveled road was posted by the asphalt-paved Garden State Parkway in New Jersey: 263.7 million miles with only one death.

The New Hampshire Turnpike, by the way, has established an incredible record of low maintenance cost. For that matter, asphalt pavements in the Granite State are always easy on the highway department's housekeeping budget. In 1959 the 142 miles of modern-design asphalt on the primary system cost $106.43 per mile to maintain. The 167 miles of portland cement concrete pavement cost $262.17 per mile.

NEW INSTITUTE PUBLICATIONS

Specifications & Construction Methods for Asphalt Curbs and Gutters—A new edition, containing new material and presented in new format, of an informational brochure first published three years ago. New edition is 16 pp., re-cast as a working specification exclusively. Specification Series No. 3.

Compaction of Asphalt Pavements—This is a reprint of a paper on this timely subject, given by Chief Engineer A. S. Wellborn of The Asphalt Institute, at the Fifth Annual Arkansas Highway Short Course. Information Series No. 112.

Asphalt for Off-Street Paving & Play Areas—A 36 pp. manual on sound paving practices for parking areas, driveways, sidewalks and recreation areas such as tennis courts, playgrounds and swimming pools. Includes material on these subjects from the Asphalt Handbook, new edition. Manual Series No. 9.

ASPHALT INSTITUTE Quarterly

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Glynn Harvey

Editor

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Cover

The Search for Stability (page 8) covers the entire range of road surfacing. Soil stabilization is only one aspect of research in asphalt technology. Basic to the study of asphalt pavement performance are these laboratory specimens, demonstrating various mixtures and gradations of aggregates and asphalt cements. Here, too, the search goes on for maximum stability under field conditions.

The Asphalt Institute Quarterly is published by The Asphalt Institute, an international nonprofit association sponsored by members of the petroleum asphalt industry to serve both users and producers of asphaltic materials through programs of engineering research and education.

The member companies of the Institute, who have made possible the publication of this magazine, are listed on page 15.

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PAVING THE 'PIKE

1

(1) Before and after view of the latest section of the Turnpike to receive an asphalt concrete overlay.

(2) A typical section of pavement resurfaced this year. Note spalling and settlement down centerline and extensive asphalt patching.

(3) Joints were cleaned of old filler and sealed before resurfacing.

(4) Old asphalt patches were removed and cavities scoured in advance of the paving machines.

(5) To protect the pavement base from the damaging intrusion of water, drainage is being installed in the median.

(6) Prior to resurfacing, a leveling course was placed down the centerline to correct slab settlement.

(7) Shoulders are being stabilized with asphalt the full length of the Turnpike.

(8) Down goes the two-inch binder course, to be followed by an inch of dense-graded surface course, completing the overlay (9).

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ANOTHER 25.9 MILES of Pennsylvania Turnpike get an ASPHALT Mat

THEY called it an "engineering dream" when it was opened to traffic in October 1940.

And it was, too. For 160 uninterrupted miles between Pittsburgh and Harrisburg, the original section of the Pennsylvania Turnpike fled across a lush countryside and drilled through the tumbling mountains. Four lanes wide, with eight-foot shoulders and a ten-foot-wide median between the dual roadways, it was an engineering vision that sold a new generation of American travelers on the pay-as-you-ride formula.

But time, and the relentless hammering of increasingly heavier wheel loads, levied their own special toll on this grand-daddy of modern toll roads. As the years rolled along, slabs began failing and had to be replaced. Then, as slab failures began out-running the construction crews, patching and resurfacing with asphalt took over.

Finally, in 1954, twenty-two miles of cracked and spalling slabs were resurfaced with asphalt. Another 37.5 miles were overlaid with asphalt a year later and, in 1956, an additional forty miles were cushioned with asphalt after sixteen years of service.

As this great 160-mile toll road rounded out its second decade this year, contractors were hurrying to complete the resurfacing of yet another 25.9 miles before the snow flies. Picking up where they left off in 1956, the paving crews were pushing east from the vicinity of Fort Littleton to the Blue Mountain tunnel. Quite probably, the 1961 construction season will see the remaining thirty-eight miles across the rich meadowlands of southern Pennsylvania surfaced with asphalt.

A three-inch cushion of asphalt concrete was placed during 1960 construction. This included two inches of binder (1½ inches maximum-size stone and 25 percent of minus-eight material) and one inch of tighter wearing course (half-inch maximum size slag and fifty percent of minus-eight material). Asphalt used in both courses is a 70-80 penetration grade, with four and one-half percent by weight being used in the binder and nine percent or nine and one-quarter percent (depending on type of slag used) going into the surface mix.

The 1960 work, being done by two contractors in three sections, call for 82,988 tons of binder mix and 38,220 tons of surface mixture. Total bid price for the entire 1960 project was slightly over $1.8 million, including asphalt stablization of 270,334 lineal feet of shoulders and 130,899 lineal feet of median.

As in other years, preparatory work involved asphalt subsealing of unstable slabs. However, this was performed well in advance of the resurfacing work, leaving the contractors' crews only to remove old patches, clean out the joints and patch holes, and place the asphalt mix. Settlement of the

slabs had developed a depression along much of the centerline, requiring a leveling course in some places to restore a suitable camber.

For the first time, the 1960 resurfacing contract called for asphalt stabilization of the shoulders and median strip. Existing shoulders had been macadamized to a depth of three inches during original construction. New work included the addition of three inches of crusher-run material, the entire six inches blended and mixed with an asphalt emulsion at a rate of two and one-half gallons per square yard. Similarly, existing raised or flat medians were excavated and stabilized to form a depressed drainage flume. Drainage pipe was installed to handle the run-off and reduce seepage of snow and ice melt beneath the pavement structure.

To the critical eye, the stabilized shoulders appeared to be a little low in asphalt content. However, the Turnpike Commission has been engaged in a program of shoulder stabilization all the way east from the Ohio line and have been using this same formula with great success. Cost of this phase of the work approximated 47 cents per square yard.

Fitted to its new black asphalt overcoat, with stabilized shoulders, another stretch of the turnpike is beginning a brand new life, and one that can last almost indefinitely—thanks to the miracle of asphalt rejuvenation.

R:Not to be taken with a grain of salt

Concrete Bridge Decks on New York Thruway Salvaged With Asphalt Overlay

Damage to Thruway deck slabs from de-icing salts and chemicals changed from minor cracking to distintegration of the rigid slab

Where damage required removal of the deck slab, repair usually has meant resurfacing with double thickness of asphalt concrete

THE New York Thruway Authority is pushing a three-year, $3 million program to overhaul 572 concrete bridge decks, all in various stages of deterioration due to the effects of de-icing salts and chemicals. Repairs range from a simple tar emulsion seal coat where damage is limited to minor cracking, all the way to replacing the distintegrating deck with a double thickness of asphalt concrete.

First bridge to show serious damage was the span over the Schoharie River which was resurfaced in 1957, three years after the opening of the 506-mile main stem. The Schoharie bridge was resurfaced early in 1957; but when deterioration of the slab continued, the asphalt concrete mat was removed that fall and further treatment of the underlying deck was made before a new asphalt surface was placed.

The general bridge rehabilitation program got underway in 1958 when some 86 bridges were repaired at a cost of almost $900,000. The accelerated program has continued through 1959 and 1960 and some observers believe that all bridges on the Thruway, including those now being sealed, may require extensive repair eventually because the chemical reaction within the slab probably is continuing beneath the sealant.

(The 32 bridges on the 24-mile-long Berkshire Spur, built in 1958, have been surfaced with an asphalt concrete mat and are expected to remain unaffected by de-icing agent.)

Substantial stretches of roadway also are being resurfaced with asphalt. About four and one-half miles of Thruway just east of Rochester were salvaged this year with three inches of asphalt concrete laid in two courses. This is one of the older sections, built in 1949 and 1950. Another half-mile section near Utica was resurfaced this year, matching the companion eastbound pavement that received the same treatment in 1959.

This is a view of section of pavement near Rochester which had to be resurfaced this year with a three-inch overlay of asphalt

"We Must Strive for an Optimum in Both Quality and Economy . . ."

By H. A. Radzikowski

WE have been convinced that there is need for improvements in the requirements and tests for the compaction of subgrades, base, and surface courses (of asphalt pavement structures). It was noted with interest, therefore, that the 1960 *Asphalt Handbook* has clearly stated recommendations in respect to compaction. The use of AASHO Test Method T-180 is recommended in determining the densities of base and subgrade courses. The following criteria are recommended:

1. Cohesive Subgrades—Minimum 95 percent Modified AASHO density for top 12 inches and minimum of 90 percent for all fill areas below the top 12 inches.
2. Cohesionless Subgrades—Minimum 100 percent of Modified AASHO density for top 12 inches and minimum of 95 percent below this for all fill areas.
3. Bases, Subbases and Improved Subgrades—The compaction load and contact pressure should be as high as the material being compacted will support without undue rutting and/or displacement.

This is a higher degree of compaction than is required by AASHO Test Method T-99. Conferences have been held on this subject which were attended by representatives of The Asphalt Institute, the State highway departments, the tire and rubber industry, compaction equipment manufacturfers, and the Bureau of Public Roads. Some of the provisions in regard to compaction which are now incorporated in your Handbook no doubt are based upon some of these discussions.

In these conferences, it was brought out that base and embankment compaction under some present specifications were accomplished with contact pressures ranging from 40 to 50 pounds per square inch. The tire manufacturers indicated that the trend in new tires for over-the-road hauling is toward the steel fabric types which will exert gross contact pressures up to 90 pounds per square inch. . . .

These remarks were excerpted from the paper delivered at the June meeting of The Asphalt Institute directors by Mr. H. A. Radzikowski, Chief of Development, Office of Operations, U. S. Bureau of Public Roads. "Rad," as he is familiarly known to hundreds of State highway engineers, is probably one of the most knowledgeable highway engineers in the world. Since his graduation from Tufts College more than three decades ago, Mr. Radzikowski has grown steadily in professional stature. His services have been sought by the Department of State and United Nations to counsel with other nations on highway matters. In his present post, he is mainly responsible for the refinement of techniques, equipment and materials and for their smooth integration into the great road program.

It was also brought out during these conferences that present compaction requirements do not always reflect or take into consideration the effect of variations in tire inflation pressures and wheel loads imposed on the structure of the pavement by motor vehicles. The contact pressure exerted by tires can vary to a considerable extent. For example, when the tire is soft under low inflation pressure, the contact area over which the wheel load is transmitted to the pavement is large and therefore the pressure in pounds per square inch is relatively small. On the other hand, when the same tire is fully inflated, the contact pressure in pounds per square inch for the same wheel load is higher because the contact area is smaller. These densification characteristics are recognized in the 1960 *Handbook* of The Asphalt Institute and you are to be commended on your leadership in crystallizing this problem. . . .

The 1960 *Handbook* of The Asphalt Institute recommends that consideration be given to the use of asphaltic base courses in the interest of improved quality and frequently in the interest of economy. Slightly over half of the State highway departments now have provisions in their standard construction specifications for asphalt base courses. These include stabilized, penetration and plant-mixed types. Plant-mixed asphaltic base courses are the most frequently used by some twenty States who have provisions for this type. . . .

In regard to the selection of pavement types, a subject in which I am sure you have no small interest, the Bureau has recently issued an instruction manual for the preparation and submission of the revised estimate of the cost of completing the Interstate System. . . .

The tremendous program of highway improvements that is now under way has presented many challenges to all of us in the highway industry. We are faced with a need to accelerate the rate of highway construction and at the same time insure high quality and economy in the end product. In accepting this responsibility, highway officials have taken a new look at their own operations. They have introduced new methods and equipment to increase their engineering productivity and to secure better quality control. . . .

This open-mindedness on their part will lead to additional improvements which will benefit the highway program. As a member of the highway team, the cooperation of The Asphalt Institute is also needed. We look to you for further improvements in petroleum products that are in use in the highway program and better tests which will correlate the characteristics of bituminous materials as determined in the laboratory with their future performance in base and surface courses. . . .

THE SEARCH FOR STABILITY

The Good Earth is Much Better Mixed with ASPHALT

ONE of the nagging worries that vex highway engineers is a looming shortage of good road-building aggregates in many areas. As existing deposits of these minerals are played out, one state after another must face the bleak prospect of importing materials at high cost—or finding a substitute.

Actually, there is no substitute for stone (using the word in its broadest Websterian meaning: concreted earth or mineral matter). But there is an abundance of what we can call "unconcreted" earth or mineral matter. This embraces soils composed principally of fine sands, silts and clays. These soils have very unreliable load-bearing characteristics (except at optimum water content) because they contain infinitesimally small particles that are affected by change in water content.

SOILS REACT TO WATER

The mineralogical and chemical character of the soil particle materially affects the amount of water that will adhere to it. For instance, montmorillonitic clays are extremely sensitive to water, their volume changing tremendously on wetting and drying; other clays are affected less noticeably. Also, the ionic structure of the soils has a critical bearing on this reaction to water. Clays containing such ions sodium and potassium will adsorb comparatively more water than the same clays containing ions such as iron or calcium.

To control as far as possible fluctuation of the water content at which maximum stability occurs (due to changing weather conditions), chemical additives and water-insoluble binders are used to cement these minute particles together and to prevent further adsorption of water films. This is called soil stabilization, or the treatment of natural soil to provide load-bearing strength under all weather conditions.

It's a tremendously complex problem, engaging the energies of scores of research engineers in dozens of laboratories. At The Asphalt Institute, Assistant Engineer of Research Vytautas Puzinauskas has been grappling with some aspects of the problem for more than three years, prying open a few doors to catch fleeting glimpses of the quarry.

From a paper Everest of data sheets and graph curves, Puzinauskas has extracted a few promising leads.

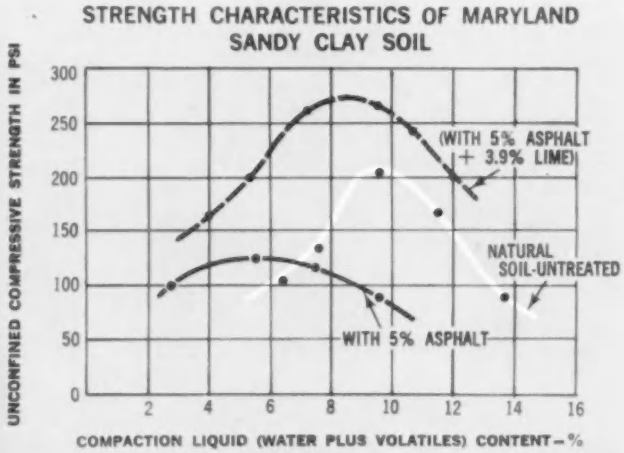
RESEARCH SIGNPOSTS

Item: The addition of asphalt alone (as a waterproofing agent) appears to reduce the strength of some natural soils while increasing their resistance to water. (Some fine-grained soils are naturally cohesive and have great compacted strength, but are quickly reduced to the consistency of mud when immersed in water.)

Item: The addition of a cementing additive (orthophosphoric acid, limes, etc.) apparently increases the strength of the natural soil considerably at optimum water content, but seems to contribute little to the stability of the soil under environmental conditions (repeated soaking and drying).

Item: The combination of asphalt and a cementing chemical appears to boost the load-carrying strength of the soil and maintain it at a satisfactory level for an extended period of time under simulated environmental conditions.

Item: Asphalt with phosphoric acid, in combination, shows the highest compressive strength under all con-



ditions. But asphalt with the more economical and abundant lime offers great promise for practical application.

It's a mistake, according to Chemical Engineer Puzinauskas, to describe soils as hydrophilic (water-loving) and hydrophobic (water-hating). He points out that all soils are basically hydrophilic, being intimately associated with water from the beginning of time. If you like, there are only degrees of hydrophilia according to the chemical character of the soil particle.

"SPLITTING THE ATOM"

The problem is further complicated by the flaky nature of some clays. A rounded grain of sand may be coated with a very minute quantity of asphalt. But most clays, on the other hand, take the shape of a plate. Picture a tiny cube which can be very thinly sliced, continuously exposing fresh surface areas. Something like this happens when we are dealing with certain fine-grained soils. For instance, a single gram of kaolin clay (about the size of a pencil eraser) may be flaked off to expose surface areas which, if placed edge to edge, would cover a floor area larger than the average room. Even more incredibly, a gram of montmorillonite, commonly found in Wyoming and the Dakotas, will yield an exposed area the size of a football field. Stabilizing such vast water-sensitive areas is quite a problem.

The Asphalt Institute investigations were launched in 1957, using seven chemical additives and three soil types—Massachusetts clayey silt, Mississippi loess and Maryland sandy clay. As a waterproofing and binding agent, an RC-O asphalt cutback was used. Later this program was shaken down to the use of a single soil type (the Maryland clay which was readily available and fairly typical) and three cementing additives—ortho-phosphoric acid, hydrated lime and portland cement. These additives were used singly and in combination with asphalt.

MIX DESIGN TESTS USED

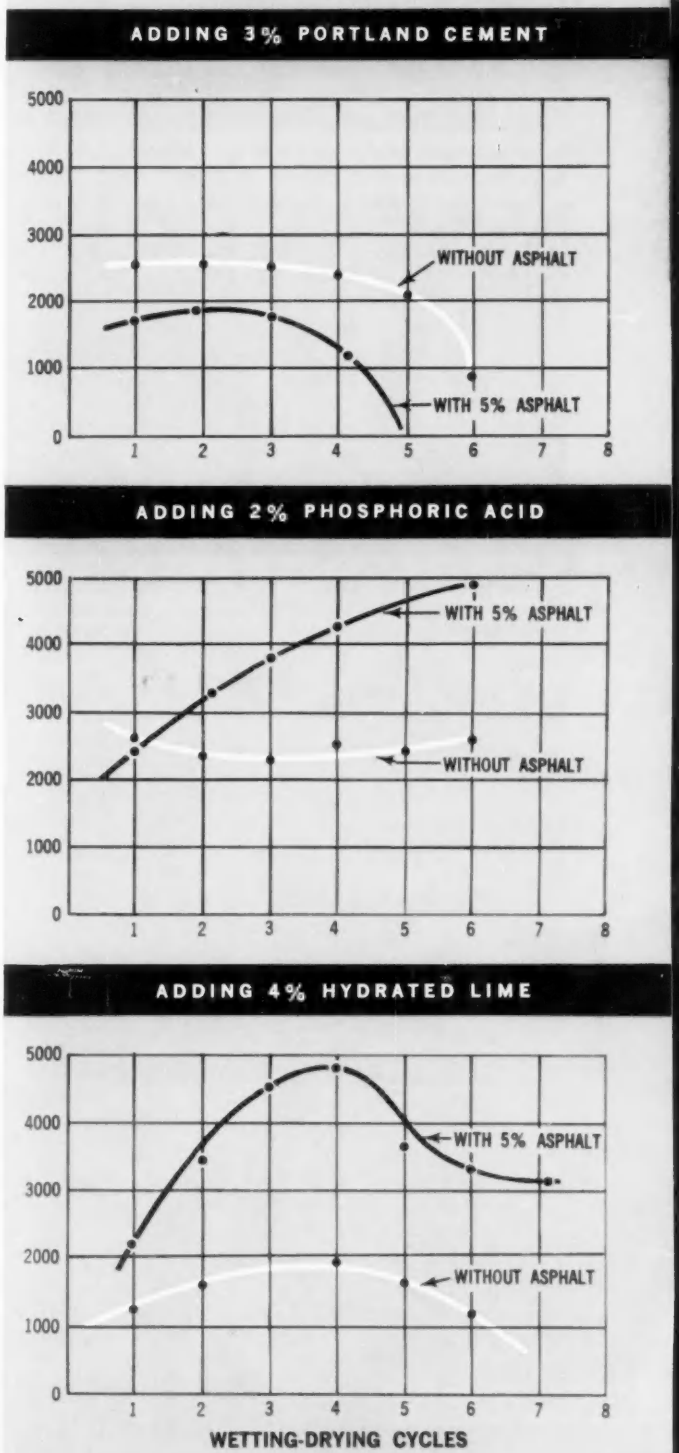
Regular mix design test methods and equipment were used to determine strength, density and water content. These techniques and apparatus were used because it was felt that data acquired this way would have more meaning to highway engineers familiar with the test procedures and terms. Later it was decided to apply only the Marshall compaction and stability test and the modified AASHO compaction test for density and unconfined compressive strength. It was a streamlining process to permit the program to move at an accelerated pace.

After accumulating a wealth of laboratory data, Puzinauskas in 1959 moved out into the field and constructed eight test panels in The Institute's research tract. Additional test data provided by cored samples taken at various intervals supported the laboratory findings.

Curves shown on the composite graph offer a "flash" picture of the relative density and strength characteristics of the soil in various combinations. This is a plot of tests run using the modified AASHO method. Other graphs show the effect of wetting-drying on Marshall stability, using Maryland soils in combination with three different additives with and without asphalt.

EFFECT OF ASPHALT ON WETTING-DRYING OF MARYLAND SOIL USING THREE DIFFERENT ADDITIVES

(MARSHALL STABILITY VALUES)



ASPHALT UNDER WRAPS

HISTORY is loaded with coincidence.

For instance: in 1953 the Congress passed the tidelands oil bill. This ended a long wrangle between the Federal government and the states over ownership of these submerged lands, handing them over to the states. At the same time, by lifting the cloud on the title, it opened them up to oil exploration.

BETTER PIPELINE NEEDED

Right away, it was obvious there was only one sensible way to move crude to shore from oil rigs working ten or twenty miles out in the Gulf of Mexico—by pipeline. It was equally obvious that someone would have to build a better pipeline. The conventional marine pipeline (tar-enamel wrapped and encased in a heavy concrete overcoat) left much to be desired. For one thing, it cost too much to handle and place. Also, the brittle casing cracked badly under deflection strain, permitting corrosion to begin its dirty work.

What was needed was a tough, pliable mastic coating—heavy enough to nullify the natural buoyancy of the pipe—which could be applied economically and efficiently. And here is where the long arm of historical coincidence reaches in.

Just such a coating already was field-tested and ready, developed to handle a 200-mile project contracted by Southern Natural Gas Company.

GENERAL'S IDEA

Two years earlier, General P. H. Timothy, retired army engineer officer (and chief of engineering operations for the United States armies in Europe during World War II), had tackled the problem. The use of asphalt in hydraulic engineering was no mystery to General Timothy. When he was an assistant division engineer at New Orleans for the U. S. Army, Corps of Engineers, he proposed grouting the Galveston sea jetty with asphalt in 1935. For a quarter of a century, this jetty has successfully weathered hurricanes and broiling sub-tropical sun.

The old concept of pipe-coating dealt in terms of a corrosion-resistant layer (the tar-enamel wrap) surrounded by a weight-coat (rigid concrete) to overcome buoyancy. General Timothy and his associate, C. W. Shaw, however, thought in terms of an asphalt mastic that could be applied efficiently in a single, continuous operation.

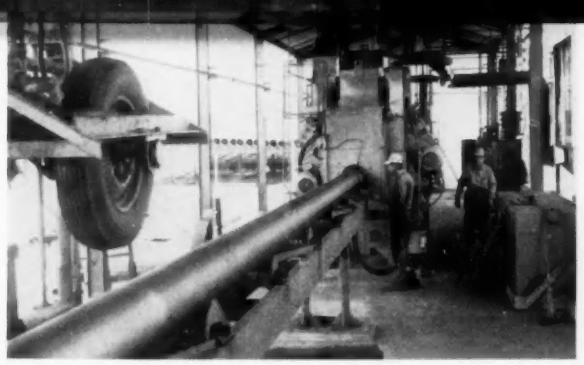
First, they went looking for aggregates and fillers that would give high density, weight and stability. They found what they were looking for in silica sand and barite (for weight), and pulverized barite for filler. This produced a dense mix which could be varied in weight (by proportioning the aggregates) from 136 pounds per cubic foot up to 220 pounds per cubic foot.

Selection of a base asphalt was next. The developers found it necessary to modify the properties of the asphalt to improve the dielectric qualities of the mastic, and to prevent cracking with severe handling. This was accomplished by adding synthetic rubber to the molten asphalt, first as a rubber powder, later as a water latex emulsion.

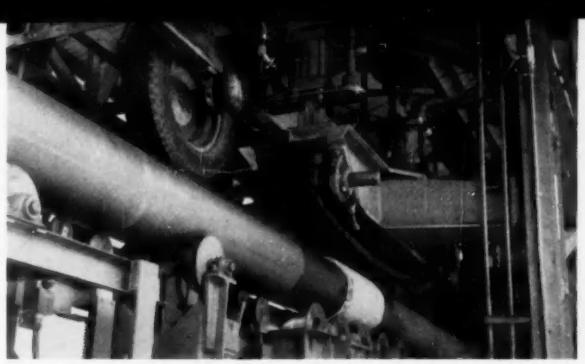
Finally, reinforcing glass fibers were added to the mix. This was found necessary in order to apply mastic in thicknesses as great as two and one-half inches in a single coating operation, previously considered impossible. But the glass filaments in the mix made it possible, along with a revolutionary new machine which extruded the material around the pipe at very high viscosity, then consolidated and densified it until the compressive muslin winding could be applied.

FLOATING PLANT BUILT

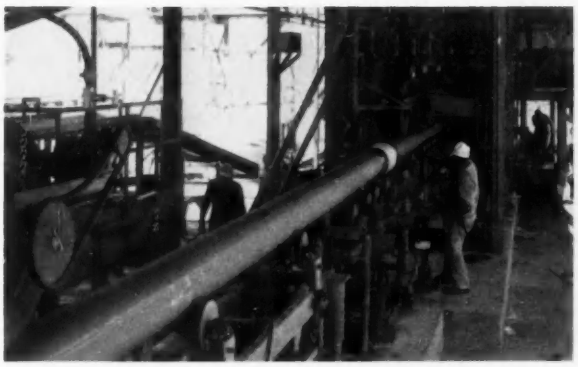
First plans were to construct a floating plant, supplied by shuttle barges. The idea was to coat the pipe in a continuous extrusion process, feeding it overside at the job site from the barge-plant. A pilot plant was set up ashore, in an area chalked off to represent the deck of the proposed barge. The pilot plant proved out successfully and in 1956 it was mounted on two barges and about thirty miles of 12¾-inch pipe was laid for the Southern Natural Gas Company.



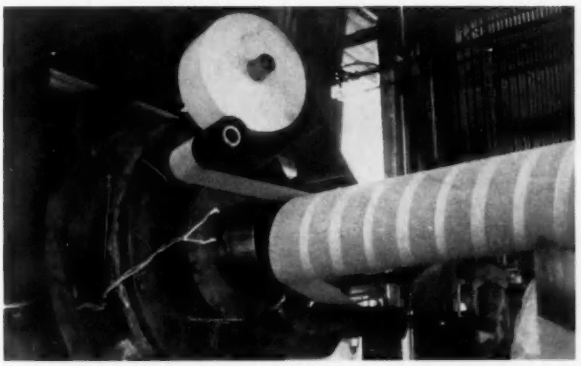
(1) Grit blasting and shot-peening cleans raw pipe



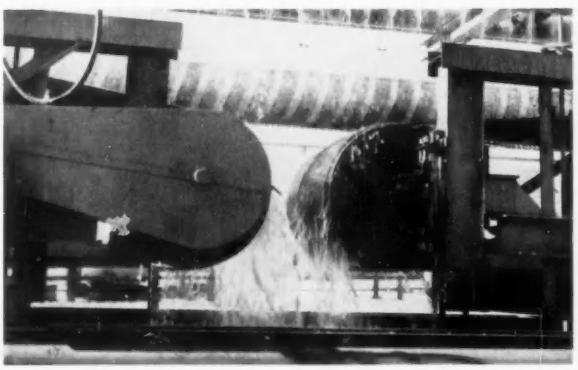
(2) Collar keeps pipe ends clean for field joints



(3) Pipe on way to oven for asphalt coating process



(4) Hot coated pipe muslin-wrapped to prevent sag



(5) Spray cools asphalt and shrinks muslin wrapper

(6) Coated pipe may be bent to a 102-degree angle

However, in actual practice, the floating plant idea developed some drawbacks. The principal flaw was the limitation on production. Six thousand feet of pipe per day was regarded as maximum production and many days production fell far short of this due to various delays.

It was felt that, if a continuous operation could be maintained, the production should flow at a rate of from 1200 feet per hour for large pipe to 4000 feet per hour for small-diameter pipe. Pipe sizes normally coated in the floating plant ranged from 6⅝ inches through 12¾ inches.

NOW SET UP ASHORE

A second plant was built ashore, at Belle Chasse, Louisiana, in 1958. It was located on the Intracoastal Canal and equipped to receive and store bare pipe, and to store and load out coated pipe. The advantages of an on-shore plant readily became apparent. It was possible to operate around the clock without interruptions and delays incident to weather and barge movement. Coating capacity at the new plant is phenomenal; as much as 37,000 feet of small diameter pipe have been coated in a single day. These coatings range from ⅜-inch up to 2½ inches and are applied to the pipe in weight per cubic foot from 125 pounds to 220 pounds. Pipe sizes handled at the Belle Chasse plant range from four inches up to twenty-four inches.

Field performance data, now being accumulated, are proving out the superior qualities of these thicker mastic coatings. With the minimum protective coating thickness (three-eighths of an inch), more than four times that of the old double-coated and wrapped coal-tar enamel. Timcoat is ready to handle the transportation of offshore crudes and other minerals and chemicals.

HYDRAULICS

LOOK WHAT THEY'VE DONE

CONNECTICUT TOWN TRANSFORMS MUDDY

WALLINGFORD, Connecticut, is a pleasant, bustling little New England city with its quota of elm trees and pizza parlors.

Until recently, Wallingford's principal claims to distinction were its silver and brass industries and Choate, an Ivy League preparatory school. To these now may be added a third: local pride in the world's largest asphalt-paved swimming pool—64,000 square feet of surface area.

The Wallingford Park and Recreation Commission never really planned it that way. It just happened.

THE SILT PROBLEM

Until last spring the Wallingford Community Pool was a typical town swimming hole, created by diverting water from the brook that meanders past the International Silver Company plant on its way to the Quinnipiac River. But, in recent years, silt—carried in from the brook—had accumulated to an intolerable extent. Youngsters, returning home from a splash in the pool, looked like resident members of the long-defunct Quinnipiac Indian tribe. Attendance began dropping—from 90,000 three years ago to 70,000 in 1958, down to 55,000 last year.

In 1958, the murky waters gave the townspeople a pretty good scare. A youngster wandered away on a ploy of his own, leaving his clothing on the bank. This led to a false drowning alarm which sent skin-divers down to probe the muddy bottom. Only the timely reappearance of the youngster halted plans to drain the pool.

LIONS CLUB PROJECT

This disturbing little episode awakened Wallingford to the danger of the heavily silted water and the Lions Club launched a drive to raise funds for the construction of a new community swimming pool. This drive fell short, but in 1959 the Lions did turn over a total of $10,000 to the town selectmen who matched it with an appropriation of $32,800.

The total still fell far short of the estimated $100,000 that would be needed for a conventional-type pool large enough to meet the needs. That was when Town Engineer Gerald W. Dabbs and New Haven Trap Rock Company Engineer

—Photos: Russell C. Rosa

TO THE OLD SWIMMIN' HOLE!

HOLE INTO CLEAR POOL WITH ASPHALT

Robert B. McKeagney (former Asphalt Institute division engineer) put their heads together. Out of this meeting came a design for an asphalt-paved pool that could be constructed for about $39,000—safely within the budget.

Construction began with the removal of 500 cubic yards of silt that had accumulated on the pool's bottom. On the natural sandy subgrade were placed a thousand cubic yards of gravel for subbase, followed by two thousand tons of processed stone base to a thickness of four to six inches. This stone—ranging in gradation from 1¾ inches down to ¾ of an inch—was rolled and tamped. A happy succession of light rains occurring during this operation helped in maintaining a desirable moisture content.

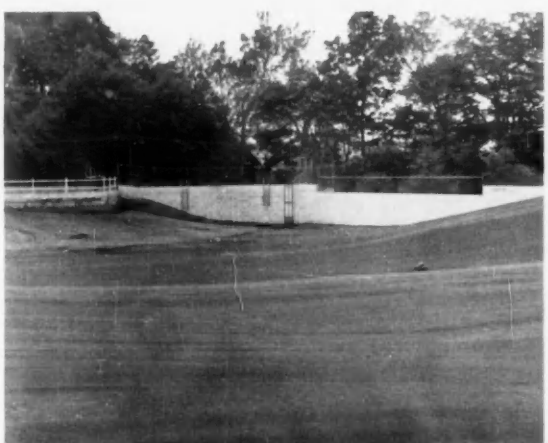
THREE-INCH THICKNESS

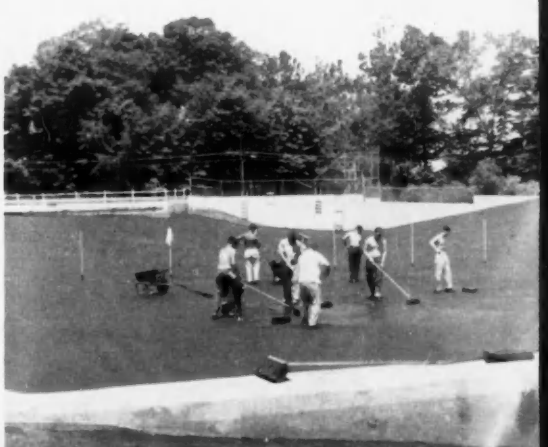
Engineer McKeagney insisted on three inches of asphalt concrete surface, placed in two lifts (two inches of binder and one inch of dense surface mix). The application of the asphalt concrete in two lifts proved a wise move. The two inches of binder turned out to be, more accurately, a leveling course. It provided a reasonably smooth and stable operating base for the machines, permitting placement of the dense, rich surface mix to a greater degree of smoothness—and gave the necessary added thickness to those areas "skinned" during placement of the binder.

Binder mix design called for a ½-inch maximum size stone in a dense-graded mixture with about six percent asphalt content. The surface mixture called for a ⅜-inch maximum size graduation with above-normal asphalt content.

Although an asphalt concrete lining for hydraulic structures usually is used because it is impermeable, this was a secondary consideration in building the Wallingford pool. The objective was a firm lining which could be cleaned periodically of the silt that will continue to sift into the pool from the brook despite construction of a series of filtering chambers. A storm gate at the downstream end of the pool permits speedy draining for this purpose.

After application of a primer spray (one-tenth of a gallon per square yard), an emulsified filler was brushed into the surface voids and, after curing, covered with a turquoise acrylic finish.





LINKED TO CITY MAIN

A drain pipe was laid around the rim of the pool and a tile drain and full piping system was installed in the foundation before paving to relieve hydrostatic pressure that might rupture the asphalt concrete lining. In addition, subterranean pipes were placed, linking up with the town water line so the pool may, if desired, be filled from this source.

The physical design of the pool is interesting. The shape is roughly oval and the pool is approximately 320 feet long, from inflow to diving wall. The primary area of about 120 feet ranges in depth from zero to three feet maximum. This is essentially a wading pool for small fry, ending at an aluminum fence which marks the boundary of the secondary area, a full-size 50-meter Olympic swimming pool ranging from three feet to eight feet in depth. The third area is the diving pool with a maximum depth of nine feet, six inches.

Cost of paving, including preparation of base and construction of an asphalt lip curb around the entire "beach," was about $10,000. Drainage, piping, filter chambers, landscaping and other adjuncts accounted for an additional $29,000.

POOL PAYS OFF PROMPTLY

The pool paid for itself within minutes after its formal opening in June. In the bustle attending the opening a youngster was jostled into the diving well and, in the course of his rescue the boy's little sister fell into the deep water unobserved. But within a matter of moments, her body was spotted in the crystal-clear water and fished out before tragedy struck.

A year ago, the murky waters might have claimed a victim under these conditions.

Institute Board Weighs Test Road Data

THE Asphalt Institute has set up a special Board of Study to evaluate and analyze data developed in AASHO Road Test and other road tests conducted here and abroad in the last decade. The study program will include in 1962 a comprehensive international Conference on Asphalt Pavement structures to be held at an American university to be designated.

Complementing the work of the Study Board will be cooperative research projects at two major State universities—University of California and Ohio State University—financed in part or entirely by the Institute. This phase of the program is now being negotiated.

Dr. J. E. Buchanan, president of The Asphalt Institute, said the Board of Study will be headed by Mr. Fred N. Finn, the Institute's AASHO Road Test Project Engineer. He will head up a staff consisting of statisticians, engineers, technicians, consultants and asphalt technologists from Institute member companies.

The study group, said Dr. Buchanan, also will have the advisory services of a Steering Committee composed of member company technologists. This committee consists of Messrs. Norman W. McLeod, Imperial Oil Ltd., Toronto; Vaughn R. Smith, American Bitumuls & Asphalt Co., San Francisco; J. O. Izatt, Shell Oil Co., N. Y.; George H. Beddoe, Ashland Oil & Refining Co., Ashland, Ky.; Roland Vokac, Husky Oil Co., Cody, Wyo.; D. W. Gagle Phillips Petroleum Co., Bartlesville, Okla., and John M. Griffith, Engineer of Research, The Asphalt Institute.

Chief Engineer A. S. Wellborn of the Institute expressed his conviction that an era of uniform procedure in asphalt pavement thickness design is close at hand.

"The Asphalt Institute has had thickness design curves and procedures in general use for several years and, so far, they

have proved adequate," he said. "Although the AASHO Road Test has not yet been completed, indications to date are that the Institute thickness design curves are substantially on target."

Wellborn pointed out that the asphalt sections on the AASHO Test Road have performed about as expected, producing the anticipated percentage and degree of failure under controlled traffic application. Although not designed by The Asphalt Institute, the behavior of these test sections, he explained, bears out the Institute's recommended thickness design procedures, setting the stage for developing rational design formulae.

The nature and characteristics of an asphalt pavement, involving many critical elements, have required design engineers to employ the empirical method of arriving at adequate design thicknesses. This has created a host of nettlesome problems in trying to achieve a uniformity of design.

THE ASPHALT INSTITUTE

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(As of October 1, 1960)

The Asphalt Institute is an international, nonprofit association sponsored by members of the petroleum asphalt industry, to serve both users and producers of asphaltic materials through programs of engineering service, research and education. Membership is limited to refiners of asphalt from crude petroleum. Institute members provide quality products and advocate quality construction and timely maintenance.

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